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## Some Harmful Foods met with in Everyday Practice.

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(Presented to the Scottish Metropolitan Division, N.V.M.A.)

Mr. President and Gentlemen,—It is often the case that an apology for submitting a paper is offered to an audience where none is called for. On this instance, however, I feel that one is really necessary, because being your Secretary I am more or less responsible for the arrangements of the meeting.

It is very unfortunate that three times our plans have been upset for this meeting, and at the eleventh hour I have had to do my best to fill the gap.

I have chosen for my subject one which is constantly before the general practitioner, and I have taken, more or less at random, a few foods merely to serve as an opening for what, I hope, will be an interesting discussion.

One could, of course, talk of harmful foods and errors in diet for days on end, and some of you, I trust, will refer to matters that I have left untouched in this somewhat scrappy paper.

There are some harmful foods with which everybody is familiar, while others, again, are not met with so frequently. Every practitioner has had experience of the damage done in a stable by feeding musty oats, and it is a curious thing to me that musty oats are used for feeding to horses as often as they are, because their bad condition is so patent. The illness they cause is quite definite and the symptoms well recognised, the polyuria, great thirst and rapid emaciation being familiar to all. One could quote many instances of musty and mouldy foods doing considerable damage to stock. When foods become fermented and musty, certain chemical changes take place. The carbohydrates are reduced to sugars, alcohol and $CO_2$, with the formation also of some organic acids such as lactic, acetic, etc. The proteins are split up into the simpler amino-acids, some of which may be toxic, and the fats are reduced to fatty acids, and may become rancid. With regard to moulds, these are not regarded as being toxic themselves, but they form toxic products, especially from the proteins, and all mouldy foods, especially nitrogenous foods, should be looked upon with suspicion. It is nevertheless true that mouldy feeding cakes are being fed to cattle almost daily.

### FEEDING CAKES.

Feeding cakes and meals that are by-products resulting from the extraction of oil from the oleaginous seeds are sometimes the cause of illness among stock. This may be due to one of several causes. (1) The food itself may contain a toxic or irritant material; (2) it may be made from seed that would be quite wholesome if sound and fresh, but which may have undergone some decomposition before crushing; (3) the cake may contain some poisonous seeds owing to accidental adulteration or to careless screening of badly-harvested crops; (4) it may have become dangerous owing to storing in a damp place or to keeping a consignment too long before using; (5) many cakes are quite suitable for feeding to adult stock that would be harmful to young animals, chiefly owing to a high content of fibre; and, finally, some cakes and meals contain a very high percentage of protein, and therefore require feeding with care.

Of feeding cakes that contain harmful constituents, one may mention cotton cake and rape cake, while there are other cakes not used for feeding to animals, but which are utilised solely for manure.

*Cotton Seed.* Though cotton seed cake and meal are among the most commonly used and popular nitrogenous concentrated foods, they are not altogether free from harmful properties. They are often blamed for causing illness, and certainly sometimes do. Cotton seed by-products produce ill effects, because the seed contains a toxic alkaloid, named by W. A. Withers and F. E. Carruth, "Gossypol," and also on account of the fibrous husk and the lint which at times is present in undesirable quantity.

As everybody knows, there are two varieties of cotton cake, decorticated and undecorticated. The former is the by-product produced when the husk and lint are removed before the oil is expressed. This leaves a highly nitrogenous cake containing on an average 8 per cent. of fibre as compared with 20 per cent. or more present in undecorticated cake, where the husk and lint are not removed. Speaking generally, neither the husk nor lint do any harm to adult cattle or sheep when the cake is fed in normal quantities; but it certainly does do harm occasionally when eaten by young animals such as calves and lambs. Calves and lambs when with their mothers frequently eat out of the same trough, and, on occasion, eat too much cotton cake. Some cotton seed, notably that from Uganda and some varieties from India, holds an exceptionally high percentage of lint, and in one instance brought to my notice a manufacturer of undecorticated cotton cake made from Uganda seed had to issue a special warning that the cake was not fit for feeding to lambs, as he

had had so many complaints regarding it. In many cases dead lambs are examined by agricultural authorities, and I strongly suspect that in some instances the presence of a few husks and a little lint in the stomach and intestine are erroneously blamed for causing death.

In America, where large quantities of cotton seed by-products are used, many animals have been poisoned by the alkaloid *gossypol*, and I am not so sure that some of the unexplained deaths among young stock, or deaths attributed to lint, have not been caused by *gossypol*. I have only once personally come in contact with what I regard as undoubted *gossypol* poisoning, and this was among some ewes in Mr. Harle's practice. In this case the cake, so-called, consisted more of raw seeds and lint than real cake, and should not have been fed. Of domestic animals, pigs are the most likely to become poisoned, and then calves and lambs, and though some pig breeders use cotton seed cake and meal, personally I do not like it for these animals.

*Rape Cake.* Rape seed or Colza seed (*Brassica napus*) is often contaminated with mustard seed, which grows with it. If the mustard seed is present in sufficient quantity, it may be poisonous, acting as an intense irritant. Some samples of rape cake are more dangerous than others, while those made from what is known in the trade as "feeding rape" are supposed to be free from harmful mustard seeds. Extracted rape seed meal is quite harmless, even supposing that mustard seeds were present, as the exposure to steam under pressure destroys all harmful properties. There are several recorded cases of mustard poisoning from eating rape cake, and I had a curious case not long ago where a sheep dog was poisoned from eating the mixture out of a sheep's trough. I find that students often have considerable difficulty in recognising rape cake, as they confuse it with linseed cake. Really there is no need for any doubt, but should there be any difficulty, the matter can easily be settled by breaking the rape cake, when the freshly exposed surface will show a characteristic greenish yellow colour. This colour, however, soon goes on exposure to the air. Not a great deal of rape cake is fed to animals as such; it is usually ground up and incorporated with other foods to make compound cake.

As I have said, cakes are sometimes the cause of trouble when they are made from seeds that have been damaged before crushing. Those cakes most likely to give cause for complaint are ground nut cake, copra cake, and possibly palm kernel cake. Ground nut seeds when exported with the husks on are sometimes wetted by the natives in order to increase the weight. The result of this is that during transport a considerable amount of fermentation may take place, with the liberation of decomposition products, some of which, derived from the proteins, may be toxic, while the fatty acids liberated from the fat are exceedingly irritating to the intestinal tract. Some damaged ground nut cake has been found to contain as much as 75 per cent. of free acidity, as compared with 28 per cent. in normal material. Copra which has been badly dried or which has been shipped damp is also very liable to yield a cake containing a high percentage of free acidity.

A very common cause of purging in cattle is the feeding of cake that has been kept over from the end of one winter to the following autumn. Such cake, especially if kept in a damp place, is inclined to be rancid, and has a marked irritating effect on the intestinal tract. It is true that some cakes, such as linseed cake, will keep for an almost indefinite period, especially if kept dry, and it is also true that there has been a great improvement in the keeping qualities of cakes of late years, owing to the fact that the machinery has been adjusted to remove more oil than formerly, and, apart from there being less oil to go rancid, the cake is much harder, and is therefore not so liable to absorb moisture from the air. Cakes that are most likely to go rancid on keeping are palm kernel cake, copra cake and ground nut cake. I have known maize germ cake to give excellent results when fed fresh to cattle, but the same consignment caused serious purging when what was left over was fed at the end of the summer. With these cakes especially it is a wise plan not to purchase in large quantities, and a three months' supply should be the most that should be stored.

Of poisonous seeds that are sometimes found in feeding cakes castor seed is the most common. Cockle seed (*Agrostemma githago*), a very dangerous weed seed, is not likely to be present except possibly in compound cakes where cereal screenings of foreign origin are ground up and incorporated. But there are several recent records of horses being poisoned from eating oats heavily contaminated with this seed. So much is known about castor seed poisoning that it is unnecessary to do more than mention it.

Soya bean cake and meal, when first they came upon the home market a few years ago, were the cause of many complaints. Soya bean cake is a perfectly safe, wholesome, and valuable food, free from any toxic quality. It is, however, very rich in protein, and must be fed with due care. If any food containing a high percentage of protein were to be eaten in excessive quantity, it would become toxic. It is possible to "poison" oneself with prime beef steak. Most of the cases of alleged poisoning by soya beans have been due to irrational feeding, and the fault has been with the feeder and not with the food. There was, however, a very curious trouble among cattle which was investigated by Sir Stewart Stockman in 1916, where soya bean meal had been fed. It was found that in this case the particular solvent used, trichlorethelyne, had in some unexplained manner acted upon the beans and left the residue toxic.

*Foods containing Cyanogenetic Glucosides.* Some two or three hundred plants and seeds have been found to contain a cyanogenetic glucoside. That is, a glucoside which will be acted upon by a co-existent ferment in the presence of warmth and

moisture and be split up into HCN, glucose, and some other substance such as acetone. The ferment is not active when the plant is dry, and it is destroyed by great heat, especially moist heat. Contrary to what appears to be the general belief, the ferment is not destroyed during the manufacture of cakes where the seeds are given a preliminary cooking in what is called in the trade the "kettle." The temperature in the kettle seldom or never reaches 100° C., certainly never in the centre of the mass, so that the ferment remains active in the pressed cake. On the other hand, with extracted meals, the solvent is removed from the residue by steam under considerable pressure, and this effectively destroys the ferment, so that extracted meals are quite safe so far as prussic acid is concerned. Ordinary pressure or "old process" cakes and meals still contain an active ferment and an undamaged glucoside.

Of the large number of plants that contain these poisonous glucosides there are fortunately only a very few that are of importance to us. These are the Java bean (*Phaseolus lunatus*), some vetches (*Vicia sp.*), some of the *Graminæ*, such as sorghum, or millet and maize, and lastly, common linseed (*Linum usitatissimum*).

*Java Beans or Red Rangoon Beans.* These appear on the market in three varieties. (1) The many-coloured Java beans, which are black, purple, dark red or mottled; (2) red Rangoon beans of rather a rich red colour; and (3) white Rangoon beans or haricot beans.

The first, or Java beans, are distinctly dangerous, and have been found to contain as much as 9 grs. per lb. of HCN, and, according to Professor Lander, 2lbs. of the beans may be capable of poisoning a bullock, on the assumption that 20 grs. of the HCN is the lethal dose. These dangerous beans very seldom appear on the market. The red Rangoon beans are a common market commodity, but as they contain very much less of the glucoside, they are not so dangerous, and undoubtedly large quantities are consumed without causing any trouble. The white beans contain but a trace of glucoside, if any, and may therefore be regarded as a perfectly safe food.

Among the grasses the glucoside is found in maize and sorghum, but a considerable amount of the prussic acid is liberated during the drying of the plants, especially when the drying is done slowly. The glucoside seems to be more abundant during some seasons than in others, and it appears that when the plants are stunted in growth, the glucoside is also in greater amount than when growth has been normal. Apart from the possibility of poisoning from eating Java beans, the only plant that may cause us any trouble in this country is linseed. The glucoside, *linamarin*, is almost invariably present in linseed. According to Professor Lander, an average quantity may be taken as 1·75 grains per lb., and, therefore, 11lbs. of cake would require to be eaten by a bullock for a toxic dose to be ingested. I wish especially to draw your attention to linseed cake. One may, I think, take it for granted that adult cattle and horses are never poisoned by either linseed or linseed cake, but that calves may be and sometimes are.

An important point to be noted is that the HCN is liberated in the stomach, and that small quantities of dextrose or maltose in the stomach seem to prevent the free formation of the poison. When formed, the HCN is quickly absorbed and quickly eliminated; it is not an accumulative poison, so that small quantities may be set free in the stomach without causing any harm. This is undoubtedly what happens with adult stock when fed on linseed and linseed cake. Supposing, for instance, that a bullock were to eat 6lbs. of linseed cake, an unusually large amount, I think it may be taken for granted that the first quota of HCN formed would be eliminated before there was any possibility of a toxic dose being set free in the body. As 11lbs. of the cake would require to be consumed before the minimum toxic dose could be taken into the body, I think we may rightly assume that it is not possible to poison horses and cattle by linseed or linseed cake. With calves, however, the position is not so happy. Relatively a larger quantity of linseed, in the form of crushed linseed or cake, is eaten at a meal, and it is the common practice to steep the linseed in warm water before feeding, and sometimes to make it up into balls, which is the most dangerous method of giving linseed to calves. The steeping in warm water facilitates the action of the ferment, and when calves eat balls of linseed meal they sometimes swallow them whole, and the HCN is liberated in what may be called an explosive manner, so that it is quite possible for a toxic dose to be absorbed from the stomach.

Notwithstanding the fact that calves are undoubtedly occasionally poisoned by linseed, I think that very considerable caution is required in giving an opinion based on a chemist's report of his analysis of a suspected food. If a chemist finds HCN in linseed cake, which he usually will do, he says so in his report and gives the quantity found. Unless he is also a veterinary toxicologist he offers no opinion as to the toxicity of the food. It is not his job. It is for the practitioner to interpret the findings of the chemist, and it will be clear to you that because a small quantity of HCN may be found in a food, that by no means indicates that it was the cause of any illness.

*Flesh Products.* These include blood meal, meat meal and cracklings or greaves. Cracklings or greaves is the residue obtained from knackeries and tallow melting factories. It consists of fibre, cartilage and bone, etc., and is the residue left after the fat has been melted and removed by hydraulic pressure. Cracklings and similar by-products form one of the familiar constituents of dog biscuits, poultry and pheasant foods, etc. It is mentioned here because there are two sorts, good and bad. The former is made from fresh material and the latter from stale material. Most practitioners at some time or another have had troublesome outbreaks

of diarrhœa among dogs, and not infrequently these can be traced to a consignment of dog biscuits which appear to be quite good. The enteritis and diarrhœa may be due to bad flour or, what is much more likely, to cracklings made from flesh that had begun to decompose before treatment. Both decomposed protein and rancid fat are extremely dangerous for dogs, especially for so-called pets.

*Fish Meal.* Fish meal has been figuring very strongly in the agricultural press of late. Butchers and bacon curers are constantly condemning the use of fish meal, while on the other hand stockowners persist in using it, and animal nutritionists advise that it should be a regular constituent of the rations of growing stock. The explanation of these diverse opinions is that there are two varieties of fish meal. One is made from fish refuse of undesirable nature, chiefly herring offal, while the other, known as *white fish meal*, is made from the heads, tails, bones and small fish of white fish only, and does not contain any herring offal. The former article if fed to stock invariably taints the flesh to such an extent that it is quite uneatable, smelling and tasting of crude cod liver oil. If fed to hens, the eggs become tainted in a similar manner. If this so-called fish meal has been fed to pigs, and its use discontinued for two months or even longer before killing, the flesh still retains the taint, which seems to become more pronounced when the flesh is cured and cooked. The use of fish meal became more general during and after the war, and strong efforts were made to foster the trade by inducing feeders to make use of it. It is extremely unfortunate that good and bad samples were sold without discrimination, because so much horrible pork and bacon and so many fishy eggs have been marketed that a great outcry against the use of any fish meal is being made by produce dealers and butchers. It has, however, been proved by stock feeders in ordinary practice, and recently by Dr. Orr, at the Rowett Institute, that real white fish meal can be fed up to the day of slaughter without any fear of tainting the flesh. The value of fish meal lies in its high protein content, but more especially in its high percentage of minerals, such as calcium phosphate. It is, therefore, a very valuable food for young growing stock, especially sty-fed pigs and for poultry kept on the intensive system. Real fish meal is now sold under a guarantee as white fish meal, and other kinds are better described as fish guano, and should be used only for manure.

## Some Aspects of Animal Mechanism.

### Professor Sherrington's Address to the British Association.

The following are some of the more important passages occurring in Professor Sir C. S. Sherrington's Presidential Address to the British Association at Hull, on the subject of "Some Aspects of Animal Mechanism." The report in this form is reproduced from *The Pharmaceutical Journal*.

Commonly questions most difficult are those that can be quite briefly put. Thus, "Is the living organism a machine?" "Is life the running of a mechanism?" The answer cannot certainly be as short as the question. But let us, in the hour before us, examine some of the points it raises. . . . It might be thought that the problem is presented at its simplest in the simplest forms of life. Yet it is in certain aspects more seizable in complex animals than it is in simpler forms. And so let us turn thither.

Our own body is full of exquisite mechanism. Many exemplifications could be chosen. There is the mechanism by which the general complex internal medium, the blood, is kept relatively constant in its chemical reaction, despite the variety of the food replenishing it and the fluctuating draft from and input into it from various organs and tissues. In this mechanism the kidney cells and the lung cells form two of the main sub-mechanisms. And one part of the latter is the delicate mechanism linking the condition of the air at the bottom of the lungs with that particular part of the nervous system which manages the ventilation of the lungs. On that ventilation depends the proper respiratory condition of the blood. The nervous centre which manages the rhythmic breathing of the chest is so responsive to the respiratory state of the blood supplied to itself that, as shown by Drs. Haldane and Priestley some years ago, the very slightest increase in the partial pressure of carbon dioxide at the bottom of the lungs at once suitably increases the ventilation of the chest. And dovetailed in with this mechanism is a further one working for adjustment in the same direction. As the lung is stretched by each inbreath the respiratory condition of the nervous centre, already attuned to the respiratory quality of the air in the lungs, sets the degree to which inspiration shall fill them ere there ensue the opposite movement of outbreath. All this regulation, although the nervous system takes part in it, is a mechanism outside our consciousness. Part of it is operated chemically; part of it is reflex reaction to a stimulus of mechanical kind, though as such unperceived. The example taken has been nervous mechanism. If in the short time at our disposal we confine our examples to the nervous system, to do so will have the advantage that in one respect that system presents our problem possibly at its fullest.

#### Reflex Action.

To turn, therefore, to another instance, mainly nervous. Muscles execute our movements; they also maintain our postures. This postural action of muscles is produced by nerve-centres which form a system more or less their own. One posture of great importance thus maintained is that of standing, the erect posture. This involves due co-operation of many separate muscles in many parts. Even in absence of those portions of the brain to which consciousness is adjunct the lower nerve-centres successfully bring about and maintain all this co-operation of muscles which results in the erect posture. For instance, the animal in this condition, if set on its feet, stands. It stands reflexly. More than that, it adjusts its standing posture to required conditions. If the pose of one of the limbs be shifted, that shift induces a compensatory shift

in the other limbs, so that stability is retained. A turn of the creature's neck sidewise and the body and limbs of themselves take up a fresh attitude appropriate to the side-turned head. Each particular pose of the neck telegraphs off to the limbs and body a particular posture required from them, and that posture is then maintained so long as the neck posture is maintained. Stoop the creature's neck and the forelimbs bend down as if to seek something on the floor. Tilt the muzzle upward and the forelimbs straighten and the hind limbs crouch as if to look up at a shelf. Purely reflex mechanism provides most kinds of ordinary postures.

Mere reflex action provides these harmonies of posture. The nerve-centres evoke for this purpose in the required muscles a mild, steady contraction, with tension largely independent of the muscle length and little susceptible to fatigue. Nerve-fibres run from muscle to nerve-centre. By these each change in tension or length of the muscle is reported to the activating nerve-centre. They say "tension rising, you must slacken," or conversely. There also play a part organs whose stimulation changes with change of their relation to the line of gravity. Thus, a pair of tiny water-filled bags set one in each side of the skull. In each of these a patch of cells endowed with a special nerve. Attached to hairlets of these cells a tiny crystalline stone whose pressure acts as a stimulus through them to the nerve. The nerve of each gravity bag connects, through chains of nerve-centres, with the muscles of all the limbs and of one side of the neck. In the ordinary erect posture of the head the stimulation by the two bags right and left is equal, because the two gravity stones then lie symmetrically. The result, then, is a symmetrical muscular effect on the two sides of the body, namely, the normal erect posture. But the right and left bags are mirror pictures of each other. If the head incline to one side the resulting slip, microscopic though it be, of the two stones on their nerve-patches makes the stimulation unequal. And from that slip there results exactly the right unsymmetrical action of the muscles to give the unsymmetrical pose of limbs and neck required for stability. That is the mechanism dealing with limbs and trunk and neck. An additional one postures the head itself on the neck; a second pair of tiny gravity-bags, in which the stones hang rather than press. These, when any cause inclining the head has passed, bring the head back at once to the normal symmetry of the erect posture. And these same bags manage the posturing of the eyes. The eye contributes to our orientation in space; for instance, to perception of the vertical. And for this the eyeball, that is the retina, has to be postured normally. The pair of little gravity-bags in the skull, which act to restore the head posture, also act on the eyeball muscles. Whichever way the head turns, slopes, or is tilted, these adjust the eyeball's posture compensatingly, so that the retina still looks out upon its world from an approximately normal posture, retaining its old verticals and horizontals. As the head twists to the right the eyeball's visual axis untwists from the right. These reactions of head and eyes and body unconsciously take place when a bird wheels or slants in flight or a pilot stalls or banks his aeroplane. And all this works itself involuntarily as a pure mechanism, whose analysis we owe mainly to Professor Magnus and Dr. de Kleijn, of Utrecht.

### Examples of Mechanism.

Each insight into mechanism reveals more mechanism still to know. Thus, hardly was the animal's energy balance in its bearing upon food intake shown comfortably to conform with thermodynamics than came evidence of the so-called "vitamins." Unsuspected influence on nutrition by elements of diet taken in quantities so small as to make their mere caloric value quite negligible; thus, for the growing rat, to quote Professor Harden, a quantity of vitamin A of the order of 1-500 milligram a day. Again, as regards sex determination, the valued discovery of a visible distinction between the nuclear threads of male and female brings the further complexity that in such cases sex extends throughout the whole body to every dividing cell. Again, the association of hereditary unit-factors, such as a body colour or shape of wing, to visible details in the segmenting nucleus seemed to simplify by epitomising. But further insight tends to trace the inherited unit character not to the chromosome itself, but to balance of action between the chromosome group. . . . We owe to Lucas and Adrian the demonstration that without any nerve-centre whatever an excised nerve-trunk with its muscle attached can be brought to yield, besides conduction of nerve impulses, the extinction or attenuation or augmentation of them. . . . The nervous system, including its centres, consists of nothing but chains of cells and fibres. In these chains the junctions of the links appear to be points across which a large impulse can pass, though a weak one will fail. . . . As pointed out by Professor Alexander Forbes, it may be, therefore, that the nerve impulse is the one and only reaction throughout the whole nervous system, central and peripheral, trains of impulses simply interfering, colliding and over-running as they travel along the interconnected branches of the conductive network. In this may lie the secret of the co-ordination of reflexes. The nerve-centre seems nothing more than a meeting-place of nerve-fibres, its properties but those of impulses in combination. Fuller knowledge of the mechanism of the nervous impulse, many of whose physical properties are now known, a reaction open to study in the simplest units of the nervous system, thus leads to a view of nervous function throughout that system much simpler than formerly obtained.

The fibres of nerve-trunks are perhaps of all nerve-structures those that are best known. . . . If severed, say, by a wound, they die for their whole length between the point of severance and the muscle or skin they go to. And then at once the cut ends of the nerve-fibres start re-growing from the point of severance, although for years they have given no sign of growth. The fibre, so to say, tries to grow out to reach to its old far-distant muscle. . . . How does the nerve-fibre find its lost muscle microscopically miles away? What is the mechanism that drives and guides it? Is it a chemotaxis like that of the antherozooid in the botanical experiment drawn towards the focus of the dissolved malic acid? If so, there must be a marvellously arranged play of intricate sequences of chemically attractive and repellent substances dissolved suitably point to point along the tissue. It has recently been reported that the nerve-fibre growing from a nerve-cell in a nutrient field of graded electrical potential grows strictly by the axis of

the gradient. Some argue for the existence of such potential gradients in the growing organism. Certainly nerve regeneration seems a return to the original phase of growth, and pieces of adult tissue removed from the body to artificial nutrient media in the laboratory take on vigorous growth. . . . All seem to argue that the mutual touch between the several cells of the body is decisive of much in their individual shaping and destiny. New ground is being broken in the experimental control of tissue growth. The report of the Imperial Cancer Research Fund mentions that in cultivation outside the body malignant cells present a difficulty that normal cells do not. To the malignant cells the nutrient soil has to be more frequently renewed, because they seem rapidly to make the soil in which they grow poisonous to themselves, though not to normal cells. The following of all clues of difference between the mechanism of malignant growth and of normal is fraught with importance which may be practical as well as theoretical.

### Mental Phenomena.

If we knew the whole how of the production of the body from egg to adult, and if we admit that every item of its organic machinery runs on physical and chemical rules as completely as do inorganic systems, will the living animal present no other problematical aspect? The dog, our household friend—do we exhaust its aspects if in assessing its sum-total we omit its mind? A merely reflex pet would please little even the fondest of us. True, our acquaintance with other mind than our own can only be by inference. We may even hold that mind as object of study does not come under the rubric of Natural Science at all. But this Association has its Section of Psychology, and my theme of to-night was partly chosen at the instance of a late member of it, Dr. Rivers, the loss of whom we all deplore. As a biologist he viewed mind as a biological factor. The keeping of mind and body apart for certain analytic purposes must not allow us to forget their being set together when we assess as a whole even a single animal life.

Taking as manifestations of mind those ordinarily received as such, mind does not seem to attach to life, however complex, where there is no nervous system, nor even where that system, though present, is quite scantily developed. Mind becomes more recognisable the more developed the nerve-system. Hence the difficulty of the twilit emergency of mind from no mind, which is repeated even in the individual life history. In the nervous system there is what is termed localisation of function, relegation of different work to the system's different parts. This localisation shows mentality, in the usual acceptation of that term, not distributed broadcast throughout the nervous system, but restricted to certain portions of it. . . . To pass from a nerve impulse to a physical event, a sense-impression, percept, or emotion is, as it were, to step from one world to another and incommensurable one. We might expect, then, that at the places of transition from its non-mental to its mental regions the brain would exhibit some striking change of structure. But no; in the mental parts of the brain still nothing but the same old structural elements, set end to end suggesting the one function of the transmission and collision of nerve impulses. The structural inter-connections are richer, but that is a merely quantitative change.

I do not want, and do not need, to stress our inability at present to deal with mental actions, or *vice-versa*. But facing the relation borne in upon us as existing between them, may we not gain some further appreciation of it by reminding ourselves even briefly of certain points of contact between the two? Familiar as such are, I will merely mention rather than dwell upon them.

One is the so-called expression of the emotions. The mental reaction of an emotion is accompanied by a nervous discharge which is more or less characteristic for each several type of emotion, so that the emotion can be read from its bodily expression. This nervous discharge is involuntary, and can affect organs, such as the heart, which the will cannot reach. Then there is the circumstance that the peculiar ways and tricks of the nervous machinery as revealed to us in the study of pure reflex reactions repeat themselves obviously in the working of the machinery to which mental actions are adjunct. The phenomenon of fatigue is common to both, and imposes similar disabilities on both. Nervous exhaustion and mental exhaustion mingle. Then, as offset against this disability, there exists in both the amenability to habit formation, mere repetition within limits rendering a reaction easier and readier. Then, and akin to this, is the oft-remarked trend in both for a reaction to leave behind itself a trace, an engram, a memory, the reflex engram, and the mental memory.

How should inertia and momentum affect non-material reactions? Quick though nervous reactions are, there is always easily observed delay between delivery of stimulus and appearance of the nervous end effect; and there is always the character that a reaction once set in motion does not cease very promptly. Reflex acts commonly predispose to their opposites. So similarly the visual impression of one colour predisposes to that of its opposite. Again, the *position* of the stimulated sensual point acts on the mind—hence the light seen or the pain felt is referred to some locus in the mind's space-system. Just similarly the reflex machinery directs, for instance, the limb it moves towards the particular spot indicated. And such spots in the two processes, mental and non-mental, correspond.

Characteristic of the nervous machinery is its arrangement in what Hughlings Jackson calls "levels," the higher levels standing to the lower not only as drivers but also as restrainers. Hence in disease under-action of one sort is accompanied by over-action of another. Thus in the arm affected by a cerebral stroke, besides loss of willed—that is higher level—power in the finger muscles there is in other muscles involuntary over-action owing to escape of lower centres from control by the higher which have been destroyed. So similarly with the sensory effects. Of skin sensations some are painful and some are not—for instance, touch. The seat of the latter is of higher level, cortical; of the former lower, sub-cortical. When cerebral disease breaks the path between the higher and the underlying level a result is impairment of touch sensation but heightening of pain sensation in the affected part. The sensation of touch, as Dr. Head says, restrains that of pain.

### Mind and Body.

Thus features of nervous working resemble over and over again mental. Is it mere metaphor when we speak of mental attitudes as well as bodily? Is it mere analogy to liken the warped attitude of the mind in a psycho-neurotic sufferer to the warped attitude of the body constrained by an internal potential pain? Again, some mental events seem spontaneous; in the nervous system some impulses seem generated automatically from within. . . . Yet all this similarity does but render more succint the old enigma as to the nexus between nerve impulse and mental event. In the proof that the working of the animal mechanism conforms with the first law of thermo-dynamics can one say that psychical events are evaluated in the balance-sheet drawn up? And, on the other hand, Mr. Barcroft and his fellow-observers in their recent physiological exploration of life on the Andes at 14,200 ft. noted that, as well as were their muscles, their arithmetic there was at a disadvantage. The low oxygen pressure militated against both. Indeed, we all know that in any of us a few minutes without oxygen, or a few more with chloroform, and the psychical and the nervous events will lapse together. The nexus between the two sets of events is strict. But for comprehension of its nature we still require, it seems, comprehension of the unsolved mystery of the how of life itself. A shadowy bridge between them may lie perhaps in the reflection that for the observer himself the physical phenomena he observes are in the last resort psychical.

The practical man has to accept nervous function as a condition for mental function without breaking his heart over ignorance of their connection. The doctor, the lawyer, and we all accept it. We know that with structural derangement or destruction of certain parts of the brain goes mental derangement or defect, while derangement or destruction of other parts of the nervous system is not so accompanied. Decade by decade the connection becomes more ascertained between certain mental performances and certain cerebral regions. Certain impairments of ideation as shown by forms of incomprehension of language or of familiar objects can help to diagnose for the surgeon as to what part of the brain a tumour is compressing; and, the tumour gone, the mental disabilities pass. So similarly those who, as Professor Elliott Smith and Sir Arthur Keith, recast the shape of the cerebrum from the cranial remains of prehistoric man, can outline for us something of his mentality from examination of the relative development of the several brain regions, using a true and scientific phrenology. . . . The cortex of the forebrain is the main seat of mind. That cortex with its twin halves corresponding to the two side halves of the body is really a single organ knitting those halves together by a still further knitting together of the nervous system itself. The animal's great integrating system is there still further integrated. And this supreme integrator is the seat of all that is most clearly inferable as the animal's mind. As such it has spelt biological success to its possessors. From small beginnings it has become steadily a larger and larger feature of the nervous system, until in adult man the whole rest of the system is relatively dwarfed by it. Not without significance, perhaps, is that in man this organ, the brain cortex, bifid as it is, shows unmistakable asymmetry. Man is a tool-using animal, and tools demand asymmetrical, though attentive, and therefore unified, acts. A nervous focus unifying such motor function will, in regard to a laterally bipartite organ, tend more to one half or the other. In man's cerebrum the preponderance of one half, namely, the left, over the other may be a sign of unifying function.

### Mind and the Integration of the Animal Individual.

It is to the psychologist that we must turn to learn in full the contribution made to the integration of the animal individual by mind. But each of us can, without being a professed psychologist, yet recognise one achievement in that direction which mental endowment has produced. Made up of myriads of microscopic cell-lives, individually born, feeding and breathing individually within the body, each one of us nevertheless appears to himself a single entity, a unity experiencing and acting as one individual. In a way, the more far-reaching and many-sided the reactions of which a mind is capable, the more need, as well as the more scope, for their consolidation to one. True, each one of us is in some sense not one self, but a multiple system of selves. Yet how closely those selves are united and integrated to one personality. Even in those extremes of so-called double personality one of their mystifying features is that the individual seems to himself at any one time wholly either this personality or that, never the two commingled. The view that regards hysteria as a mental dissociation illustrates the integrative trend of the total healthy mind. Circumstances can stress in the individual some perhaps lower instinctive tendency that conflicts with what may be termed his normal personality. This latter, to master the conflicting trend, can judge it in relation to his main self's general ethical ideals and duties to self and the community. Thus intellectualising it, he can destroy it or consciously subordinate it to some aim in harmony with the rest of his personality. By so doing there is gain in power of will and in personal coherence of the individual. But if the morbid situation be too strong or the mental self too weak, instead of thus assimilating the contentious element, the mind may shun, and, so to say, endeavour to ignore it. That way lies danger. The discordant factor escaped from the sway of the conscious mind produces stress and strain of the conscious self; hence, to use customary terminology, dissociation of the self sets in, bringing in its train those disabilities, mental or nervous, or both, which characterise the sufferer from hysteria. The normal action of the mind is to make up from its components one unified personality. When we remember the manifold complexity of composition of the human individual, can we observe a greater instance of solidarity of working of an organism than that presented by the human individual intent and concentrated, as the phrase goes, upon some higher act of strenuous will? Physiologically the supreme development of the brain, psychologically the mental powers attaching thereto, seem to represent from the biological standpoint the very culmination of the integration of the animal organism.

### Man: the Greatest Social Animal.

The mental attributes of the nervous system would be, then, the coping-stone of the construction of the individual.

Surveyed in their broad biological aspect, we see them carrying integration even further still. They do not stop at the individual; they proceed beyond the individual; they integrate, from individuals, communities. When we review, as far as we can judge it, the distribution of mind within the range of animal forms, we meet two peaks of its development—one in insect life, the other in the vertebrate, with its acme finally in man. True, in the insect the type of mind is not rational, but instructive, whereas at the height of its vertebrate development reason is there as well as instinct. Yet, in both, one outcome seems to be the welding of individuals into societies on a scale of organisation otherwise unattained. The greatest social animal is man; the powers that make him so are mental. Language, tradition, instinct for the preservation of the community, as well as for the preservation of the individual. Reason actuated by emotion and sentiment and controlling and welding egoistic and altruistic instincts into one broadly harmonious, instinctive-rational behaviour. Just as the organisation of the cell-colony into an animal individual receives its highest contribution from the nervous system, so the further combining of animal individuals into a multi-individual organism, a social community, merging the interests of the individual in the interests of the group, is due to the nervous system's crowning attributes, the mental. That this integration is still in process, still developing, is obvious from the whole course of human pre-history and history. The biological study of it is essentially psychological; it is the scope and ambit of social psychology. Not the least important form of social psychology is that relatively new one, of which the President of the Psychology Section at this meeting is a foremost authority and exponent, namely, that dealing with the stresses and demands that organised industry makes upon the individual as a unit in the community of our day, and with the readjustments it asks from that community.

### The Animal Organism: A Unified Entity.

To resume, then, we may, I think, conclude that in some of its aspects animal life presents to us mechanism the how of which, despite many gaps in our knowledge, is fairly explicable. Of not a few of the processes of the living body, such as muscular contraction, the circulation of the blood, the respiratory intake and output by the lungs, the nervous impulse and its journeyings, we may fairly feel from what we know of them already that further application of physics and chemistry will furnish a competent key. We may suppose that in the same sense as we can claim to-day that the principles of working of a gas-engine or an electro-motor are comprehensible to us, so will the bodily working in such mechanisms be understood by us, and, indeed, are largely so already. It may well be possible to understand the principle of a mechanism which we have not the means or skill ourselves to construct. We cannot construct the atoms of a gas-engine. But, turning to other aspects of animal mechanism, such as the shaping of the animal body, the conspiring of its structural units to compass later functional ends, the predetermination of specific growth from egg to adult, the predetermined natural term of existence, these, and their intimate mechanism, we are, it seems to me, despite many brilliant inquiries and inquirers, still at a loss to understand. The steps of the results are known, but the springs of action still lie hidden. Then again, the how of the mind's connection with its bodily place seems still utterly enigma. Similarity or identity in time-relations and in certain other ways between mental and nervous processes does not enlighten us as to the actual nature of the connection existent between the two. Advance in biological science does but serve to stress further the strictness of the nexus between the two.

Great differences of difficulty therefore confront our understanding of different aspects of animal life. Yet the living creature is fundamentally a unity. In trying to make the how of an animal existence intelligible to our imperfect knowledge we have for purposes of study to separate its whole into part-aspects and part-mechanisms, but that separation is artificial. It is as a whole, a single entity, that the animal, or for that matter the plant, has finally and essentially to be envisaged. We cannot really understand its one part without its other. Can we suppose a unified entity which is part mechanism and part not? One privilege open to the human intellect is to attempt to comprehend, not leaving out of account any of its properties, the how of the living creature as a whole. The problem is ambitious, but its importance and its reward are all the greater if we seize and we attempt the full width of its scope. In the biological synthesis of the individual it regards mind. It includes examination of man himself as acting under a biological trend and process which is combining individuals into a multi-individual organisation, a social organism surely new in the history of the planet. For this biological trend and process is constructing a social organism whose cohesion depends mainly on a property developed so specifically in man as to be, broadly speaking, his alone, namely, a mind actuated by instincts but instrumented with reason. Man, often Nature's rebel, as Sir Ray Lankester has luminously said, can, viewing this great supra-individual process, shape even as individual his course conformably with it, feeling that in this instance to rebel would be to sink lower rather than to continue his own evolution upward.

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At a Council meeting of the British Friesian Cattle Society held in London on 20th September, 65 new members were elected, bringing the total membership to 2,011. The president, Mr. G. Holt-Thomas, complimented the Society and the Council upon passing the 2,000 membership total, and also congratulated the Hache herd upon the remarkable achievement of their British Friesian cow, Brookside Colantha, which, with a present incomplete yield of 2,727 gallons in 299 days, had broken and won the British record for annual milk production.

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The Medical Officer for Nuneaton has drawn the attention of the Health Committee to the quantity of tubercular diseased meat found on inspection, the last monthly report recording tubercular meat amounting to 1,551 lbs. This clearly demonstrated if they were to prevent tuberculosis at the source rather than spend money on sanatoria, the need of a strict and efficient supervision of all meat slaughtered, and of the necessity of veterinary inspection of cows.

**The Veterinary Record.**
*14th October, 1922.*

## VETERINARY HISTORY.

Monsieur Leon Moulé continues his detailed survey of the history of the Veterinary Art in the Bulletin de la Société Centrale de Médecine Vétérinaire, 30th September, 1922, the present section dealing with Veterinary Medicine in England, Italy and Spain in the seventeenth century. The information given with regard to England has been supplied by Major-General Sir F. Smith, K.C.M.G., C.B., to whose work on the Early History of Veterinary Literature M. Moulé pays a well-deserved tribute. Sir Frederick has, by his courtesy in furnishing a summary of the facts to M. Moulé, enabled him to give English Veterinary Science its proper place in his History.

The author also expresses his indebtedness to the translator of the article, Mr. F. Bullock, Secretary of the Royal College of Veterinary Surgeons, saying of him, "He possesses a marvellous knowledge of the French language, and his translation into French, which I publish *in extenso*, has needed only a few slight emendations from me."

"Mr. Bullock is connected with our profession by his important functions of Secretary and Registrar of the Royal College of Veterinary Surgeons, and has contributed to English veterinary periodicals several articles dealing with history, bibliography and statistics."

We are glad to record this tribute to our two most prominent workers in the field of veterinary history.

## Abstract.

### Sterility in Cows.

Infections of the genital tract of cows have been attracting the interest of scientific investigators for many years. Stimulated by the discovery of the etiologic agent of bovine infectious abortion by Bang, workers have entered the field of comparative pathology in an effort to solve the problems of bovine sterility, which have become of great importance, coincident with the increased prevalence of infectious abortion in cows. Contributions to the literature in this field have, say the authors, been for the most part clinical, although some notable work have been accomplished in bacteriology and pathology. Success of such investigations of great economic importance can be achieved only by concerted effort directed toward etiology. Although this paper deals only with the bacteriological and structural pathological considerations of the subject, there should be included at some future time more thorough investigations into the functional and chemical pathology. It is suggested that many of the problems of sterility lie beyond the vision of the microscope and that valuable additions to the literature on the subject might be obtained by careful study of sterility by workers in these branches of science.

In a general way, sterility may be said to result from either of two causes, first, congenital, and second, acquired. The congenital cause of sterility has as its underlying etiology the absence or arrested development of certain organs of reproduction. Acquired causes fall into two groups, inflammatory and non-inflammatory.

In the inflammatory group we must consider specific infections, such as are produced by *Bacillus abortus*, *B. tuberculosis* and *Actinomyces bovis*. There also exist the more important non-specific inflammations, as those caused by the invasion of parts of the female genitalia by *B. pyogenes*, streptococci and staphylococci. The female genital tract is composed of several structures, from vagina to ovary, the invasion of any one of which by pathogenic micro-organisms may produce disastrous results. We must constantly guard ourselves in interpreting structural changes, as we see them, for it must always be borne in mind that although no related bacteriologic findings co-exist, the changes in structure are in most cases associated with present or past infection. As a result of inflammation in one part of the genital tract, pathologic changes occur in another, while at the seat of the infection no visible changes in structure may be noted.

This is most clearly exemplified in the close relationship which exists between uterus and ovary, infections in one of which may produce structural changes in the other without apparently sufficiently disturbing the structure at the seat of infection to render the animal sterile. Infections as a rule lead to deviations from normal function, coincident with changes in structure. In some instances the changed structure, by purely mechanical means, may be sufficient to account for sterility. In other instances it is the resulting functional and biochemic change which is responsible for the loss of reproductive capacity. There still exists the possibility of pathologic disturbance, resulting from infection, being expressed only by changes in function, where the structural changes are not sufficient to be determined microscopically. In this last group may be placed many cases of sterility, the etiology of which cannot be accounted for by either bacteriologic or pathologic study. In the light of our present knowledge a discussion of the latter is certainly theoretical and aims to cover ignorance rather than increase our knowledge.

In the non-inflammatory group there may be included acquired displacements or injuries not resulting from infections, neoplasia, cysts and disturbed endocrine

function. The environment of the animal may be an influencing factor in endocrine stability, and as such may be a contributing cause of sterility. These may include housing, feeding and breeding. The gemeral condition of the animal with respect to undernourishment and excessive adiposity in all probability tends to suppress endocrine equilibrium, with consequent irregularities in the breeding disposition of the animal.

A discussion of some of the more important disturbances of the female genitalia with respect to etiology and pathology will be included. It is difficult to speak of disturbances in one part of the genital tract without relating them to consequent changes in other portions. It will be necessary, however, to adhere to a systematic consideration for brevity and lucidity. Such conditions as active and passive hyperæmias, anæmias and neoplasia are withheld from this report, except to mention them briefly in some instances.

### Disturbances of the Ovaries.

I.—Cystic changes are among the most frequently encountered pathologic disturbances of the ovaries. Ovarian cysts may be classified in the following manner :

1.—Simple ovarian cysts (retention cysts).
   (a) Originating from the Graafian follicle.
   (b) Originating from the corpus luteum.
   (3) Originating from remnants of the Wolffian duct.

2.—Neoplastic cysts.
   (a) Serous and pseudomucinous cystadenomata (benign).
   (b) Cystadenomata with carcinomatous change (malignant).

Retention cysts constitute the type most frequently encountered in the bovine. The Graafian follicle cyst results from failure of rupture of the follicle with consequent retention and accumulation of liquor folliculi. These cysts consist of essential elements of the Graafian follicle, with a degenerated ovum, an atrophic and flattened-out stratum granulosum and a usually increased density of the liquor folliculi. Other types may be due to disturbed or arrested development of the follicle, when, as a result cystic degeneration of so-called atretic follicles, cysts may result. The cyst resulting from the corpus luteum is seen when, in place of normal involution of the luteal structures, a cystic degeneration supervenes. Cysts of this character will be seen lined at first by flattened-out luteal cells, and later by hyalinized connective tissue and luteal detritus. The contained fluid is usually clear but may be sero-sanguineous in character. Remnants of the Wolffian duct are rarely seen as cysts in the ovary, but occasionally are encountered in the parovarian structures. Some workers have emphasised size as an indicator of cystic ovaries. It should be borne in mind that cysts may be single, in which case they are eventually large, or they may be multiple, in which case they are usually small. Size alone is no criterion by which cysts may be defined.

Neoplastic cysts of the bovine ovary seem to be of relatively infrequent occurrence. They are supposed to result from continued tubular downgrowths into the ovarian substance, of Pflüger's egg cords, or from the germinal mesothelial structures surrounding the ovary. In any case the cyst is lined by simple or stratified epithelial-like cells. The arrangement of the epithelium may be simple or papillary, and the cyst may be single or multilocular. They are to be distinguished from retention cysts in that the cells are of an actively proliferating type, marked growth impulse being always seen. The epithelial lining secretes either a serous fluid or one in which pseudomucin predominates. Malignant cysts are essentially the same, with difference in growth restrictions.

The etiology of retention cysts is believed by many workers to be inflammatory. Rosenau and Davis have associated *Streptococcus viridans* with cystic ovaries in women. Fitch, in studies upon cystic bovine ovaries, found streptococci and *Bacillus coli*. Ewing states that the "fairly constant occurrence of inflammation of the pelvic organs points to the inflammatory origin of these cysts." Other workers, notably Loeb, have been able to produce ovarian cysts by underfeeding guinea-pigs. Only by excessively underfeeding was he able to produce the condition, but then with considerable regularity.

In our studies it has not been possible to isolate, with any degree of regularity, bacteria from retention cysts of the ovaries. It seems possible, in view of this, that cystic ovaries may be produced through reflex influence upon ovarian function which may take place from uterine infections.

II.—Pathological retention of the corpus luteum is frequently seen. In some cases the yellow body undergoes continued evolution and atrophy. The luteal structures develop a fair degree of vascularity and become firmly encapsulated by connective tissue. As a result of this continued retention there is derangement of the diœstrous cycle.

III.—Inflammations of the ovary (oöphoritis) are acute and chronic. The acute types are most often associated with abscess formation from extension of peritonitis, perimetritis or salpingitis. Such infections, when associated with salpingitis frequently result in the formation of tubo-ovarian abscesses. The abscess usually occurs at the site of a ruptured Graafian follicle. As the abscess develops the tube and ovary are brought into close apposition, so as to appear irregularly as one. It may develop to an enormous size, entirely obliterating the structures in which it occurs. Such abscesses result from invasion by *Bacillus pyogenes*, streptococci and staphylococci. Chronic oöphoritis is seen as an inflammation of lower grade, in which there are proliferative changes with lymphocytic or plasma cell infiltration, rather than exudative suppurative developments. The result of this type of inflammation is to leave a fibrotic ovary.

Specific infections of the ovary, such as tuberculosis or actinomycosis, are rarely observed.

IV.—Neoplasia of the ovary in the bovine are rare and will not be considered in this report.

V.—Sterility of the ovary in the bovine, as well as in other animals, is noted in the aged. As a result of long-continued rupture of Graafian follicles and production of corpora albicantia, the ovary gradually becomes smaller and hardened. Such ovaries are usually functionless, and are spoken of as sterile or senile ovaries.

### Disturbance of the Uterine Tubes.

The importance of diseases of the uterine tubes in relation to sterility cannot be over estimated. It must be kept in mind that the uterine tubes or the oviducts are the connecting links between the ovaries and the uterus, and that the ova must pass through them in order to reach the uterus. It will be remembered that their lumen is narrow, their structure delicate, and their mucosa thrown into plicæ directed toward the centre, so that injuries, although slight, may result in temporary or permanent sterility. In this report only inflammatory conditions of the tubes will be considered.

Salpingitis may be acute, subacute or chronic, and affect any of the coats, and as such is designated as endosalpingitis or perisalpingitis. It is rather rare that the mucosa alone is attacked. It is more usual to see all coats involved in the inflammatory process. The following classification will be found to include most inflammatory conditions of the tubes :

1.—Catarrhal salpingitis (acute or chronic).
2.—Suppurative salpingitis (acute or chronic).
(a) Pyosalpinx.
(b) Hydrosalpinx.

In general it may be said that salpingitis results only from bacterial infection. The most frequent organisms seen in association with these conditions are streptococci, *Bacillus pyogenes* and staphylococci. It is doubtful whether *B. abortus* or *B. coli* are responsible for pathologic changes in the uterine tube. Salpingitis as a rule is secondary to puerperal infection, but the possibility of its being primary must be also considered. Salpingitis is often bilateral, but is not infrequently seen affecting one tube, especially in the chronic stages.

1.—Catarrhal salpingitis is acute in the early stages of mucosal inflammation. The chronic type, rarely seen, is the product of low-grade infection. Gillman has recently placed emphasis upon this type of salpingitis. Our work has not been of sufficient extent to confirm his observation. In catarrhal salpingitis the mucosa is seen in a state of active mucus secretion. The walls of the tubes are œdemic and infiltrated rather mildly with mononuclear types of cells. If the inflammation continues for a length of time, the walls will thicken and become fibrotic and fusion may occur amongst the plicæ.

2. Suppurative salpingitis is usually acute in character. The tube is diffusely infiltrated with polymorphonuclear leucocytes, and much purulent exudate distends the lumen. The plicæ flatten out and are subjected to mild pressure atrophy. The walls at first undergo pressure changes, but later, due to the inflammatory stimulus, fibrosis occurs. In this stage free drainage exists toward the cornua uteri for the purulent material.

The chronic stage is dependent upon the continued progress of the infection. The tube from increased fibrosis undergoes greater kinking and deformation. The epithelial folds undergo hypertrophy and become adherent to one another through fibroblastic proliferation. Plicæ from one side of the tube may become adherent to those of the other side. The abdominal osteum of the tube becomes closed, and later the portion of the tube near the isthmus. At times the plicæ in their fusion leave areas lined by columnar epithelium deep beneath their surfaces. These areas give the appearance of isolated glands below the mucosal surface. The tube becomes distended and the walls thinned from pressure. The adherent plicæ become much thinned and stretched from pressure. This pus-distended tube is called pyosalpinx.

The bacteria gradually die and their products undergo lysis. The tubal epithelium regenerates to some extent and secretes mucus. This secretion, together with products of lysis, forms a clear, straw-coloured fluid, distending the tube. In this state we speak of the condition as hydrosalpinx. The pathologic changes in this condition are clearly set forth in the case reports. In the human pyosalpinx and hydrosalpinx almost invariably form a retort-shaped tube with the small end near the uterus and the abdominal end adherent to the ovary. Adhesions to the ovary are as a rule seen in the bovine, but the retort-shaped tube rarely results.

Of the specific infectious diseases, tuberculosis and actinomycosis are found in the uterine tubes, the former more frequently. The pathologic changes resulting closely simulate changes characterising these diseases in other locations. In tuberculosis, pyosalpinx and hydrosalpinx may result, but with slightly different changes.

### Disturbances of the Uterus.

Only the inflammatory conditions affecting the uterus will be considered. All types of inflammations of the uterus may easily be included in :

1.—Catarrhal metritis (acute or chronic).
2.—Suppurative metritis (acute or chronic).
(a) Pyometra.
(b) Cystic degeneration of uterine glands, etc.

Subacute stages also exist, but these are late acute or early chronic stages.

The etiology of metritis may be any one of the organisms listed, or, as perhaps is more frequently the case, two or more types in association. This list includes *Bacillus abortus*, *B. pyogenes*, streptococci, staphylococci, *B. coli*, *B. tuberculosis* and *Actinomyces bovis*. It may be for the most part assumed that metritis develops only as the result of infection, although many times trauma and irritating chemicals predispose to invasion by micro-organisms.

Eggink in an analysis of 20 cases of acute and chronic metritis found the following organisms: *Bacillus*

*tuberculosis* 12 times, *B. pyogenes bovis* 14 times, streptococci 12 times, *B. coli* 6 times, staphylococci 5 times, *B. proteus* 3 times, *B. subtilis* once. In many of these cases mixed infections were present, so that from analysis of his report the most important types appear to be *B. pyogenes* and streptococci. Except in one case of tuberculosis metritis, either one or both of these important types were always found.

Lucet first described *B. pyogenes bovis* in 1893, when he studied 52 cases of suppuration in cattle. In these he found *B. pyogenes bovis* pure 10 times and associated with other organisms 7 times.

Grips later studied suppurations in swine, when he isolated rather constantly *B, pyogenes suis.* He concluded his type to be identical with *B. pyogenes bovis* (Lucet) and proposed the name *B. pyogenes* for both, a point generally accepted.

Künnemann studied many cases of suppuration in cattle and concluded that *B. pyogenes* was the most important etiologic agent. He observed this organism in 90 per cent. of cases, in 33 per cent. of which he isolated it in pure culture and in 55 per cent. associated with other organisms.

In a complete report of 18 cases (purulent. acute and chronic metritis) Wall obtained comparable results. *B. pyogenes* was found 6 times, streptococci 4 times, streptococci and *B. pyogenes* 5 times, streptococci and *B. coli* once, streptococci, *B. pyogenes* and *B. coli* once, streptococci and an anaerobic bacillus once.

Ward appears to have been the first to demonstrate the presence of *B. pyogenes* in this country. Since then the organism has occasionally been reported. Brown and Orcutt, in their "Study of *B. pyogenes,*" worked with twelve strains of the organism, five of which were isolated from cases of purulent metritis.

The results of the present investigation support the concurrence of views already cited. It seems from our studies that streptococci and *B. pyogenes* play the most pathogenic rôles in metritis and other inflammatory conditions of the genital tract of the cow.

1.—Acute catarrhal metritis is very frequently seen. It is the type of inflammation occasioned by organisms of low-grade virulence for the uterine structures. Probably *Bacillus abortus* is most often the exciting organism. Following the infection of the placenta and uterine cotyledons by *B. abortus,* an inflammation is occasioned which results in the premature delivery of the fœtus. This organism is not capable of establishing itself in the normal involuted uterus and soon disappears from that organ following the abortion. If no secondary infection follows, only a mild acute catarrhal endometritis will ensue, marked by excessive mucus discharge, which, as involution takes place, will disappear without permanent changes remaining. The mucous membrane exhibits a patchy necrosis, mucoid degeneration and exudative phenomena. The necrosis is a normal accompaniment of involution of the uterus, an expression of the physiologic discharge of the maternal placenta and remnants of the fœtal membranes. No permanent damage to the organ results if no further infection takes place. Wall states that shrinkage and atrophy of the gland mucosa may occur, with probably similar changes in the carunculæ. A stimulus such as would be afforded by a mild type of infection might lead to hypertrophic endometritis, where the uterine mucosa is much thickened. Polypoid endometritis, doubtless inflammatory in its inception, may follow similar mild attacks or those of more severity.

Chronic catarrhal metritis, similar to acute, is usually seen involving only the endometrium. It is the expression of low-grade inflammatory reaction and is a rather rare occurrence. It may sometimes be seen as in the end stage of a more severe suppurative condition. Many times a condition of the endometrium simulating a chronic catarrhal endometritis is seen in which it is impossible to isolate organisms of any kind. It is suggested that cases such as these are not true metritis at all, but are an expression of altered ovarian function. A close study of the changes of the endometrium throughout the dicestrous cycle supports this view.

2.—Acute suppurative metritis in s vast majority of cases results from puerperal infection. It may follow either an abortion or a full-term parturition, especially when force is applied to aid delivery. Retention of the placenta in either case is a vital contributing factor of utmost importance. It has already been shown that the bacillus of infectious abortion causes in itself only a catarrhal endometritis of short duration. It will be easily seen that although *Bacillus abortus* does not cause grave danger itself, it affords a lowered resistance of the uterine structures, and that during such time other pathogenic organisms may enter and cause a more severe reaction. Lowered resistance from other causes constitutes the same potential danger. The sloughing of the carunculæ should be regarded as an avenue for invasion. At times a purulent metritis is set up, which soon heals, leaving only slight sequelæ or none at all. In infections of this character a mucopurulent exudate is found in the lumen of the uterus, and the endometrium exhibits the ordinary exudative phenomena of acute exudative inflammation. The reaction may also include the muscularis and serosa. Sequential to this type of infection, increased fibrosis of the endometrium may result, together with hypertrophy of uterine and glandular epithelium. The uterine epithelium may exhibit a replacement of simple columnar type of epithelium by a stratified ectodermal type as seen in the portio vaginalis uteri. This process as observed by Wall is called "ectodermoisering." Unless this type of metritis passes on to the chronic stages, these changes are as a rule not seen.

A more severe type of infection is occasionally found. Its etiology is practically the same as for the less severe, but more often has associated with it *Bacillus pyogenes.* The inflammatory reaction is greater, much more purulent exudate is formed, and usually involves all layers of the uterus, the parauterine structures, uterine tubes and ovaries. Large pelvic abscesses usually form. It sometimes happens that the purulent exudate within the uterus is not able to

escape. The uterus fails to undergo involution (coincident with retention of the corpus luteum), and a uterus containing several liters of pus is the result. Such a condition is known as pyometra. Eventually partial drainage will establish itself if the animal survives, but the infection will persist. It is this persistent, severe, purulent metritis which, as it passes on to the chronic type, leaves a uterus certainly severely damaged, and many times with salpingitis, oöphoritis or pelvic peritonitis as sequelæ. In cases of sterility resulting from infections as just described, speculation is unnecessary when the pathology of the uterus is investigated. Even in these cases, experience has shown, under proper treatment, it is possible to have complete recovery of breeding function; in other cases where normal œstrum has been re-established, the animal fails to conceive, or if conception does occur, abortion frequently follows.

Chronic suppurative metritis has already been mentioned. It will only be necessary to describe the pathologic changes seen. These are fibrosis of the endometrium, hypertrophy of the muscularis and "ectodermoisering" of the epithelium. The gland mucosa exhibits dilated and cystic glands, resulting from occlusion of their lumina through fibrotic stromal changes. The glandular epithelium is usually flattened out from pressure, and the lumen contains polymorphonuclear leucocytes and plasma cells. An area of dense, fibrous, often hyalinized connective tissue surrounds the dilated and cystic glands. In some areas there is actual atrophy of the glandular structures. The uterine blood vessels exhibit irregular intimal thickening, especially in the caruncule. The cystic changes in the glands may be of such an extent that grossly the cysts stand out as small areas from the size of a millet seed to a pea (or larger). Such conditions are described most often as cystic degeneration of the uterus, but usually no attempt is made to associate this change with past infection. In the final stages, in place of cystic glands being the most prominent picture, a catarrhal reaction may supervene. This, together with lysis of dammed-up purulent exudate, will produce a condition simulating hydrosalpinx. This condition is spoken of as hydrometra.

In summing up the subject of metritis as related to sterility, Hallman has expressed a very tenable view:

"The lesions observed in varying degrees in the different cases are mucoid degeneration of the superficial epithelium, local and diffuse fibrosis of the uterine mucosæ, leucocytic infiltration of the stroma and gland luminæ and degeneration and disintegration of the glandular epithelium with diminution in the numbers of glands. In the majority of cases the anatomical alterations are comparatively few, and it is hardly conceivable that failure to breed was the result of loss of functional tissue of the uterine mucosæ."

In general, selecting cases of sterility as they come, our work bears out his opinion. The uterus seems especially capable of preserving itself for a long time without any marked structural damage resulting, so that it is more frequent to find, in sterile cows, a uterus in good condition so far as we can judge from structure.

### Disturbances of the Cervix.

The infections of the cervix can be classified in a similar manner to those of the uterus. The cervix is, however, more prone to become anatomically deranged. This is due to the deep cervical folds, which offer suitable abode for growth of micro-organisms. It is thus seen that the cervix may be the reservoir of virus, and from this source infections of the genital tract have their origin. As a result of inflammation the cervical folds hypertrophy and the epithelium undergoes frequently mucoid degenerative changes. Such conditions interfere with the breeding of the animal, but in many instances are relieved by proper medication and surgical manipulation. The chief danger lies in extension of the infectious process either by continuity or by metastasis through the pelvic lymphatics to other parts of the genital tract.

Of the specific infections, tuberculosis and actinomycosis are uncommon. The condition produced is in all essentials like that seen in other parts of the body as a result of invasion by the specific organisms of these diseases.

### The Present Investigation.

#### *Method of Study.*

The object during the progress of this investigation was to study cases which were diagnosed by clinical procedure as sterile. Sterility in some instances was considered as absolute, and cases falling into this group were slaughtered and the genital organs studied both pathologically and bacteriologically. Clinical history, although not always complete, is available in all cases of this group, as are also bacteriologic reports of uterine swabbings, where possible to obtain. Other animals were presented at the University clinic for treatment by one of us (Boyd), and in a majority of cases responded favourably to the therapeutic procedures employed. Since the animals were valuable pure bred stock, slaughter was held inadvisable. In these cases bacteriologic study combined with clinical data constitute the report. Cultures were also obtained from the genital tract (uterus) during the progress of the infection. This was accomplished in all cases by inserting sterile swabs into the uterus through the retracted and dilated cervical canal. At necropsy the genital organs were carefully removed and cultures systematically prepared. The medium employed consisted of 10 per cent. sterile horse serum agar in slants. The medium was inoculated and sealed off with sealing wax and allowed to incubate at 37·5°C. from 10 days to 2 weeks undisturbed. By this method types such as *Bacillus abortus* would develop. Aerobic pour plates were prepared, using agar in combination with 5 per cent. sterile defibrinated horse blood. By this method streptococci and *B. pyogenes* were most easily obtained in pure culture.

Cultures were identified individually. In the work with *B. pyogenes* the investigations of Lucet, Künnemann, Grips, Glaze and Brown were consulted. For the work on streptococci the monograph of Brown and the studies of Hollman have constituted the basis for classification. The publication of Winslow and others has been adhered to rather rigidly in the classification of the staphylococci. Although it was difficult always to have agreement of types to conform with the classification, it was thought that it represented the best system yet devised.

As soon as possible after culture material had been obtained sections were taken from various parts of the genitalia for pathologic study. These were fixed in Zenker's solution and in 10 per cent. formalin. Sections were prepared by paraffin and freezing methods. For the most part hematoxylin and eosin were employed for staining.

### Case Reports.

In all 19 cases were studied.

#### *Case* 1.

*Clinical History.*—Jersey cow, age 5 years. First calf born at 2½ years of age, full term, but born dead. Second calf aborted. Previous to abortion, agglutination reaction for *Bacillus abortus* positive in dilution up to 1-200. Six months following abortion was bred. Pronounced pregnant six weeks later. Examination one month following revealed animal to be non-pregnant. It is assumed that she aborted between first and second examinations for pregnancy. The animal never gave extreme evidence of oestrus. Bred frequently for one year following the probable abortion. Examination always showed normal genitalia. During last year blood of animal positive to *B. abortus* (agglutination reaction), up to 1-1,000. History reveals prevalence of sterility in the herd from which she came. Mother and sister of this animal always conceived with difficulty. The animal's condition was considered incurable, and for this reason she was slaughtered.

*Necropsy.—Gross Description.* — The genitalia appear normal excepting for persistent corpus luteum buried deeply in the stroma of the left ovary. The corpus luteum is 2·5 cm. in diameter. The centre of this corpus luteum presents a cystic cavity 1 cm. in diameter.

*Microscopical.*—The vagina and cervix uteri are normal. The uterus presents degenerative changes of its innermost glandularis, characterised by pyknosis of nuclei, catarrhal changes in cytoplasm, increased mucus production and desquamation of epithelium. The stroma of the endometrium is fibrotic, an excess of collagenous connective tissue appears. The tubæ uterinæ are normal. The ovaries present many primordial follicles. Other follicles are atretic. These show increased cellularity and hypertrophy of theca folliculi, hypertrophy and hyperplasia of membrana granulosa. Some cells have pyknotic nuclei and a cytoplasm showing hyaline granular degeneration. Corpora albicantia are numerous throughout the ovarian stroma.

*Bacteriologic Findings.*—Uterus, uterine tubes and ovaries sterile. Vagina showed three types of organisms, *Staphylococcus aureus, Bacillus coli, B. subtilis.*

*Diagnosis and Discussion.*—The etiology of sterility in this case is not clear. It is possible that the deep-seated corpus luteum, present in the left ovary, was a contributing factor. The ovarian change seems insufficient to produce such a condition, likewise the changes of the uterus are hardly in themselves sufficiently pronounced to inhibit implantation of the developing embryo. Combination of ovarian and uterine disturbances is the most probable cause of the animal's sterility, possibly influenced by *Bacillus abortus* at some past time.

#### *Case* 2.

*Clinical History.*—The animal was a shorthorn heifer without history of pregnancy. Two breeding services permitted within one month. Following the second a severe suppurative metritis and cervicitis was noted. Physical examination some time later revealed a severe suppurative metritis, adhesions of genitalia to rectum and colon, an enlarged right ovary, cystic left ovary, and an enlarged right tuba uterina. Animal slaughtered after thorough examination.

*Necropsy.—Gross Description.*—Massive adhesions exist about all parts of the genitalia. The uterus and cervix are pyogenically infected. The tubæ uterinæ are dilated to 6 mm. The walls are thickened and fibrous and their lumina contain considerable purulent exudate. The left ovary presents a large, persistent corpus luteum, with cystic degeneration of the central portion of the ovary. The cyst measures 4 by 5 cm. in diameter. The left ovary is 6-8 cm. in diameter and is for the most part replaced by a large, centrally located abscess cavity containing a thick purulent exudate.

*Microscopical Description.*—The uterus presents an epithelium tending to exfoliate, cystic uterine glands, with atrophic and degenerative changes in the epithelial structures. The stroma and some glands show abundant evidences of long-continued suppurative infection, as is revealed by increased connective tissue with dilation of some glands through constriction of their necks and atrophy of others. There is a fairly abundant infiltration with polymorphonuclear and mononuclear types of cells. The muscularis is atrophic. The uterine tubes present an active, acute, suppurative process of fairly long duration. The predominant picture is that of pus-cell infiltration of the mucosa and adjoining structures. The walls are thickened. The right ovary shows fibrous replacement of ovarian structures, with focal polymorphonuclear infiltration. This constitutes the abscess wall as observed grossly. One section shows a cystic follicle with marked degenerative changes of its epithelial structures.

*Bacteriologic Findings.*—Uterus and uterine tubes, *Staphylococcus epidermidis, Bacillus coli, B. pyogenes, Streptococcus mitis* (Alpha type). Right ovarian

abscess, *Staphylococcus aureus, Streptococcus mitis.* Right ovarian cyst. Sterile.

*Diagnosis and Discussion.*—Purulent cervicitis, metritis and salpingitis. Acute oöphoritis, and large corpus luteum cyst of left ovary. The etiology is in doubt only as to the predisposing cause of the infection. All changes described are the result of infection, and are of such a character that even though the active process might subside, the generative organs would be permanently damaged.

*Case* 3.

*Clinical History.*—Heifer, 2 years of age. Delivered a dead full-term calf following severe dystokia at this age. Injury resulted which within five days was followed by severe, acute, purulent metritis. Parauterine abscesses soon developed. The abscesses were evacuated twice without improvement. Cultures obtained from the exudate showed *Bacillus pyogenes* and *Streptococcus anginosus* (Beta type). The animal became emaciated and developed a septic fever with loss of appetite. Slaughter was advised.

*Necropsy. — Gross Description.* — Extensive adhesions and deformity of the genitalia exist, resulting from large parauterine abscesses. The largest abscess is 14 by 10 c.m in size. The uterus presents hypertrophic carunculæ and an acutely congested mucosa. But little exudate is present in the lumen. The right uterine tube is normal, the left is completely obliterated by the large parauterine abscess. The right ovary shows a large corpus luteum and cyst measuring 17 mm. in diameter. The left ovary, like the left tube, is lost to view in the large parauterine abscess.

*(To be continued)* pp. 807

# Association Reports.

## National Veterinary Medical Association.

COUNCIL MEETING—*continued.*

The CHAIRMAN: We only have Item No. 9, "Any other business."

Mr. REES moved that they have solicitors of their own.

Mr. AVESTON seconded.

The CHAIRMAN: We have solicitors of our own. Your resolution must be more specific. We have a solicitor of our own, but he is not specifically appointed.

The CHAIRMAN: We still have a piece of business overlooked—a suggestion as to the place of the next Annual General Meeting. Personally one has thought over this matter of annual meetings. We should be well advised if we took a place, a town in one of the branches, in rotation. This year we are meeting in the Southern branch. Next year we may meet in the Northern, the following year in the Irish, and so on. We should have, so to speak, a rota. I think it is exceedingly desirable that we should keep in touch with members even in the distant parts, and that can only be done by having annual meetings. That is merely a suggestion, of course. Take it for what it is worth. You have been in the Northern, the Scottish and the Southern. There remains one other.

Mr. GOOCH: It is really the Irish branch.

The CHAIRMAN: Strictly speaking that is true. Suppose we cannot go to the Irish, what about the Northern next year?

The TREASURER: Scarborough.

Mr. GOOCH: It was in 1871 when you last met in the Eastern Counties. I would suggest Peterborough.

A MEMBER: Or Yarmouth.

The CHAIRMAN: Get as far north as you can for choice.

The CHAIRMAN: We have Scarborough and Yarmouth suggested. Am I to put both names?

The TREASURER: I suggest you put both to-morrow.

Mr. GOOCH: Would it be possible to choose Norwich? It has easy access to the sea. I will withdraw Yarmouth in favour of Norwich.

The CHAIRMAN: I will put Scarborough and Norwich.

Eight voted for Scarborough and ten for Norwich.

The CHAIRMAN: It is a very small majority. Probably it will be better to put both names before the General Meeting.

The CHAIRMAN: Is there any further discussion?

Mr. REES: I wish to move that, "Although we appreciate the good work that Mr. Thatcher has done on behalf of this Association, yet in his dual capacity as solicitor to the Royal College of Veterinary Surgeons and this Association, the time may arise when the policy of this Association would be somewhat opposed to that of the Royal College of Veterinary Surgeons; we think it better, therefore, in the interests of the National Association to employ the services of an independent solicitor."

Mr. SUMNER: If that is the feeling, is it desirable that the President of the Royal College of Veterinary Surgeons should be President of this Association?

The CHAIRMAN: I think it is very desirable.

The CHAIRMAN: It does not follow that the resolution will apply. Mr. Thatcher has been employed by us in every case. We employ who we like.

The TREASURER: He was the solicitor for the incorporation. There has been no formal appointment.

A MEMBER: Do we anticipate anything? Is there any need to anticipate a difficulty before it looms up? There seems to be some ulterior reason.

Mr. LIVESEY: I propose this amendment, "That this Council appoint a firm of solicitors to act for it as standing solicitors, the same to be appointed each year to do such legal work as the Association may require."

The mover of the original resolution seconded.

The PRESIDENT: You withdraw your resolution then?

Mr. REES: Oh, yes.

The CHAIRMAN: I am glad, because I do not think it strictly applies.

Mr. Livesey's motion was then passed.

The CHAIRMAN: Had we better suggest a firm?

Mr. LIVESEY: Leave it in the hands of the President and General Secretary.

The CHAIRMAN: We leave it at that then? (Agreed).

Mr. HOGBEN: I want to suggest that we should provide for the representation of veterinary inspectors on the National Association. There has been a National Association of Veterinary Inspectors. That Association is no longer in existence. Cannot some body be formed for them? Just at the present moment the duties and responsibilities of veterinary inspectors are being considered by a Committee. There should be some body to which we can appeal. We might have an inspectors' section.

The CHAIRMAN: What has happened to the Inspectors' Association?

Mr. HOGBEN: I do not know. I have not heard anything from them. I am supposed to be a member. I have received no application for subscriptions. This National Association might take over the members.

The CHAIRMAN: It would be for the Inspectors to bring the facts before this Council. Is it suggested they should have a special section?

Mr. HOGBEN: I think it advisable that they should have a special section.

A MEMBER: It has simply died of inanition.

The CHAIRMAN: It has long been the opinion that the Inspectors should be part of this Association.

Major HOBDAY: Arising out of the suggestion I would like the members of this Association to consider whether the time has not arrived when this Association should be divided into sections—medical, surgical, and public health—with a representative of each section to be responsible for that section. I think it would be conducive to wider interest. I know our rules would have to be altered. But we might do more than we do by sections, each with a sectional head and some centre.

The CHAIRMAN: That has been in the minds of more than one of us. I do not think it is contrary to any of the Articles of Association. It could easily be done, and it will have to be done, very likely in the very near future.

Major HOBDAY: I am exceedingly interested in seeing the National made to go. Talking to members one found what they complained of was the multiplicity of societies to which they have to subscribe. It might be possible to appoint a committee to consider and go into the question whether or not the Defence in Manchester and the Benevolent in London, as well as the Inspectors' could not be brought into line. At present we have a multiplicity of subscriptions, and some veterinary surgeons are not in a wealthy condition; it would obviate this multiplicity and do a tremendous amount of good by increasing the power of the Association. We might appoint a small gingering committee who could look into this question and also get others to take the *Record* as well as to take charge of sections. This was felt very keenly in my district.

The CHAIRMAN: The combination of these societies was also contemplated, but it could not be effected. We were told it was impossible to run a paper of our own. It takes time. It is quite conceivable that further amalgamations will take place. Will Mr. Hogben frame his resolution?

Mr. HOGBEN: I move that a small committee should be appointed.

The CHAIRMAN: We are told that there may be this amalgamation.

Mr. HOGBEN: I will defer it to the next Council meeting, to bring up a proposition.

Mr. LIVESEY: I beg to move a resolution expressing the appreciation of the Council to the officers of the Association, and particularly to you, sir, for the way you have conducted the business of the Council throughout the year. (Applause.)

The CHAIRMAN: Any further business?

There being none, the meeting of the Council concluded.

# Notes and News.

**The Editor will be glad to receive items of professional interest in these columns.**

## R.A.V.C. Retired Pay.

The rates of retired pay for officers of the Royal Army Veterinary Services have been amended so that the service element of retired pay for such officers will now be at the rate of £187 10s. a year after fifteen years' service, with an increment of £15 a year for each year over fifteen. This amendment will have effect from the same date and under the same conditions as if it had been originally embodied in the Warrant dated September 13th, 1919 (Army Order 324 of 1919). Steps will be taken to reassess retired pay already granted in accordance with the terms of this Warrant, and individual applications will, therefore, be unnecessary.

## Obituary.

### Mr. J. H. PARKER.

Sincere regret will be felt by many friends in the north country, says the *Newcastle Chronicle*, at the death of Mr. James H. Parker, M.R.C.V.S., which is reported from Faringdon, Berks.

When the last serious outbreak of foot-and-mouth disease occurred in the north of England, Mr. Parker was sent to Newcastle as one of the Agricultural Ministry's temporary inspectors, and when Dr. McCall left the Northumberland District, Mr. Parker was left in charge. Later, he was appointed by the Ministry as one of their referees on the examination of horses under the Government's horse-breeding scheme. He was recognised as one of the best judges of horses in the country, and his death is a great loss to the profession.

Mr. Parker, who was known and esteemed by a large circle of friends, was 62 years of age.

The *Faringdon Advertiser* of October 7th contains the following:—

THE INQUEST.

Owing to the painfully sudden death of Mr. James Henry Parker, M.R.C.V.S., who, as reported in our last issue, was found dead in his bed on Thursday morning of last week, an inquest was necessary, and this was held at Mill House, the residence of deceased, on Saturday morning, before the Deputy Coroner, Mr. J. P. D. Ross Ormiston, sitting without a jury.

In his opening remarks the Coroner said he had come to inquire into the death of Mr. James Henry Parker, who was found dead in bed about 9 o'clock on the morning of the 28th inst. He had been informed that up to the day of his death deceased was in his usual health. He complained of a cold, but nothing very serious, and he did not send for a doctor. As death was sudden, and there was no reasonable certainty as to the cause of death, he thought it desirable to hold an inquest, and he also authorised Dr. Dornford to make a post-mortem examination. He should like to express his own feelings of shock and grief at the death of Mr. Parker, whom he had known for at least 20 years. He was a man of straightforward character, and he deserved the high credit in his profession which was held by those who were well qualified to judge. He was a faithful friend and good sportsman, and he bore the troubles and trials which fell to his lot with great fortitude. From the information now in his possession, which was not in his possession when he ordered the enquiry, he hoped and believed he should be able to arrive at a true and satisfactory conclusion.

The following evidence was given:—

John Henry Parker said the body which had been viewed by the Coroner was that of his father, James Henry Parker, who was 55 years of age, and was a veterinary surgeon, and lived at Mill House, Faringdon. Witness lived with him and assisted in the business. His father's general healthwas fairly good and he had not been attended by a doctor for a long time. He had a very bad cold for about a fortnight, and complained of headache, but he went about his work as usual. On Wednesday morning he attended two cases, and at dinner time said he had had a roughish morning. Some of the work which he had to do required considerable physical exertion. In the afternoon his father attended another case, and after he had his tea he went to the golf ground from 5 to 7 o'clock, but he did not think he was playing with anyone. Witness saw him at home at 7.30, and a message having come from Shefford, he (witness) prepared to go. At 8.30 his father came to him in the motor house and asked if he had all that he required, and if he could manage. He said he felt cold and should go to bed. This was not unusual, as he always went to bed between 8 and 9 o'clock, and had done so for the last three or four years. That was the last he saw of his father alive. There was no one else in the house when his father went to bed. The girl had gone and his sister was out. He called for his sister in Church Street, and she accompanied him to Shefford. They arrived home between 10 and 10.30, and did not see their father, as he had gone to bed. The next morning as his father did not come down at the usual time, he went to his bedroom about 9 o'clock and found him dead in bed. The bedroom door was partly open. He was lying in a natural position as though he was asleep. He was lying on his back with his head inclined to the left. There was nothing covering his face, and there was nothing unusual about the room. His father's professional practice was good, and his financial affairs, as far as he knew, were satisfactory. There was nothing at that time, as far as he was aware, to worry him unduly. He had domestic worries about three years ago, but he had got over them. He had had no worry recently. He had never complained of internal pains, but had complained of being sick. The sickness would sometimes continue for a fortnight, and then there would not be a recurrence for two or three years. During the last fortnight he had suffered from sickness; it came on chiefly at night; he did not see a doctor about it. At tea time on the day previous to his father's death they arranged the next day's work.

Dr. Arthur Clifford Dornford said he was a physician and surgeon, living and practising at Faringdon. About 9 o'clock on Thursday morning he received a call to Mill House. He went immediately, and on going to Mr. Parker's bedroom found him dead in bed. He thought life had been extinct three or four hours. He searched the room and drawers for bottles ar anything, but found nothing. From a superficial examination he was unable to arrive at the cause of death. and at the request of the Coroner he made a post-mortem examination on Friday night, with a mortuary assistant.

Dr. Dornford spoke in detail of deceased's internal condition, showing traces of pleurisy over the left lung; the lungs were œdematous, and there were symptoms of dropsy; there was a marked fatty degeneration of the heart; there was slight hæmorrhage and marked evidence of long-standing stomach trouble; there were four ulcers—three small and one large, and these would account for the sickness from time to time. Deceased's general state of health was very bad indeed, and he must have had wonderful pluck to keep on. He did not think the ulcers had anything to do with the cause of death. It had been explained that he had had a very strenuous day, exposed to the cold, and his opinion was that he caught a chill in the viscera, and the heart was not strong enough to overcome it. There was fatty degeneration of the liver also, and he thought deceased must have had chronic indigestion for years. The cause of death was heart failure, following on fatty degeneration of the heart and liver, and congestion of the lungs, accelerated by a chill. There was nothing else in the body or organs to account for death.

The Coroner said he was pleased to be able to say that he had arrived at the conclusion that death resulted from natural causes, and he would have been very surprised and shocked if the evidence had justified him in arriving at any other conclusion, because his personal knowledge of the late Mr. Parker was that he was a man of extraordinary will power and a man who met his trials and troubles with courage and fortitude. The doctor had

given the full results of his post-mortem examination, which proved beyond doubt that death resulted from natural causes, and also confirmed his opinion that he had carried on under most extraordinary handicaps as regards his health, without any complaints apparently, and stuck it out to the bitter end, where many a man would have gone under long before. He thought everyone present would extend their sympathy to the family, and he would also express his deep personal regret at Mr. Parker's death.

The Coroner declared a verdict "That the cause of death was heart failure, consequent on fatty degeneration of the heart and congestion of the lungs, and that death resulted from natural causes."

### The Funeral.

The remains were laid to rest in the churchyard of All Saints', on Saturday afternoon, when the service was conducted by the Rev. E. B. Lock, and amongst those present were Mr. John H. Parker (son), Mr. T. S. Parker, Scarborough, and Mr. J. E. Parker, Newcastle-on-Tyne (brothers), Mr. A. H. Pullen, Mr. S.W. Luker, Mr.W. Maidment, Mr. W. Tucker, Mr. J. R. Baxter, M.R.C.V.S. (Lechlade), Mr. H. C. Rose, Mr. E. F. Obourn, and Mr. W. McDonald. The coffin, which bore the inscription, "James Henry Parker, died September 28th, 1922, aged 55 years," was lowered into the grave where rests his elder daughter, Mary.

The floral tributes were as follows:—To Father, from Jack. To Father, from Rene. In loving memory, from Shot and Mary. In affectionate remembrance, from his brother J. E. Parker and Family. With loving remembrance, from his sorrowing sister Lizzie. In affectionate remembrance, from Ella and Syd. In loving sympathy, F. H. and Elsie. From Gladys. With deep sympathy and much regret, from W. F. Charlton (Oxford). With deep sympathy, from Bert and Emily. With sorrow, Mr. and Mrs. W. Tucker. With much regret, from Mr. and Mrs. Alan G. Haines and Mr. Bernard Haines. With kind sympathy, from Mr. H. Cecil Rose. With regret, from members of the Faringdon Institute and Services Club. With sincere sympathy, from members of the Faringdon Bowling Club. With kind remembrance, from the members of the Faringdon Golf Club.

The deceased's practice has been assigned to Major Robin Catmur, M.R.C.V.S., of Abingdon.

## Diseases of Animals Acts, 1894 to 1914. Summary of Returns.

| Period. | Rabies. Cases Confirmed. Dogs. | Rabies. Cases Confirmed. Other Animals. | Anthrax. Outbreaks confirmed. | Anthrax. Animals attacked. | Foot-and-Mouth Disease. Outbreaks confirmed. | Foot-and-Mouth Disease. Animals slaughtered as diseased or exposed to infection. | Glanders (including Farcy).* Outbreaks reported by the Local Authorities. | Glanders (including Farcy).* Animals attacked. | Parasitic Mange.* Outbreaks reported by the Local Authorities. | Parasitic Mange.* Animals attacked. | Sheep Scab. Outbreaks reported by the Local Authorities. | Swine Fever. Outbreaks confirmed. | Swine Fever. Swine slaughtered as diseased or exposed to infection |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GT. BRITAIN. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. | No. |
| Week ended 30th Sept., 1922... | ... | ... | 10 | 10 | ... | ... | ... | ... | 10 | 11 | 4 | 22 | 4 |
| Corresponding Week in 1921 | ... | ... | 6 | 8 | ... | ... | ... | 1 | 13 | 14 | 1 | 26 | 16 |
| Corresponding Week in 1920 | 8 | ... | 5 | 6 | 1 | 27 | ... | ... | 29 | 34 | 10 | 29 | 21 |
| Corresponding Week in 1919 | ... | ... | 6 | 7 | ... | ... | 1 | 3 | 41 | 65 | 1 | 44 | 43 |
| Total for 39 weeks, 1922 ... | 1 | ... | 385 | 440 | 1125 | 54906 | 2 | 2 | 875 | 1246 | 438 | 923 | 349 |
| Corresponding period in 1921 | 22 | 1 | 383 | 496 | 43 | 2958 | 10 | 32 | 1815 | 2773 | 417 | 948 | 339 |
| Corresponding period in 1920 | 23 | ... | 315 | 381 | 74 | 9602 | 10 | 17 | 3136 | 5203 | 319 | 1507 | 606 |
| Corresponding period in 1919 | 143 | 3 | 151 | 198 | 28 | 1595 | 21 | 52 | 4166 | 8349 | 225 | 1707 | 793 |

NOTE.—The figures for the current year are approximate only. *Excluding outbreaks in Army horses.

| IRELAND. | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Week ended 30th Sept., 1922 | ... | ... | ... | ... | ... | ... | ... | ... | Outbreaks 1 | ... | 5 | 28 | |
| Corresponding Week in 1921 | ... | ... | ... | ... | ... | ... | ... | ... | 1 | 7 | 2 | 6 | |
| Corresponding Week in 1920 | ... | ... | ... | ... | ... | ... | .. | ... | ... | 15 | 1 | 1 | |
| Corresponding Week in 1919 | ... | ... | ... | ... | ... | ... | ... | ... | ... | 3 | ... | 8 | |
| Total for 39 weeks, 1922 ... | ... | 1 | 1 | ... | ... | ... | ... | ... | 69 | 151 | 186 | 1042 | |
| Corresponding period in 1921 | ... | 1 | 1 | 7 | 77 | ... | ... | 70 | 209 | 88 | 462 | | |
| Corresponding period in 1920 | ... | 1 | 1 | ... | ... | 1 | 3 | 86 | 240 | 10 | 26 | | |
| Corresponding period in 1919 | ... | ... | ... | ... | ... | 1 | 1 | 126 | 186 | 29 | 92 | | |

NOTE.—The figures for the current year are approximate only.